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JUN 20 1983

MEMORANDUM

To: AWR-(Jim Matthews)

From: Regional Hydrologist, Region 6

Subject: Annual Water Use Report and Management Plan (Lake Andes NWR)

The report has been reviewed and the information provided is appreciated.

Please have the refuge manager address the following items to complete an already detailed report.

The Broken Arrow WPA should have staff gages installed to record levels.

Please have the manager forward a Water Management Plan for Karl Mundt NWR to be made a part of the subject plan.

Your cooperation in these matters is appreciated.

*C Williss
for Bob Sheen*

EN:GChesy:jlr: 6/20/83

*782-7000
605/487-7603
Called DeLores 6/20
for duplicate plan.
gc*

ANNUAL WATER MANAGEMENT PROGRAM

Lake Andes National Wildlife Refuge, Lake Andes, SD

Water Unit: Lake Andes

I. Introduction

Lake Andes is a 4730 acre meandered lake, whose water level depends entirely upon annual runoff. Two dikes cut the Lake into three units, the North, Center and South. Stop log water control structures are located within each dike, however the lack of a permanent water supply precludes any water level manipulations.

Drainage area size and surface acres for each unit of Lake Andes are shown below. Maximum and average depth figures were determined in 1962, the last time the Lake was completely full.

Unit	Drainage Area		Surface Acres of Water	Water Capacity (Acre Feet)	Depth when full	
	Acres				Max.	Avg.
South	20,000	23%	1,760	16,159	13.5	11.5
Center	11,800	14%	2,359	18,000	14.5	12.9
North	53,000	62%	611	3,015	10.5	9.1
TOTAL	84,800	100%	4,730	37,174	-	-

In 1922, Congress passed a bill establishing a high water elevation of 1437.25 feet msl for Lake Andes via the construction of an artificial outlet on the South Unit. This level was established following local complaints about flooding around the Lake.

II. 1982 Water Conditions

The last time the Lake was completely dry was in 1981. The Spring of 1982 was one of the wettest on record, with 8-11 inches of precipitation in May. The North Unit filled to overflowing. Good moisture continued and cooler than normal temperatures reduced evaporation. December snows (17+ inches) added more moisture to the Lake and as 1983 started the North Unit was completely full and the Center and South Units were 85-90% covered with water to a depth of 1½-2 feet.

1982 Water Levels

Date	North Unit	Center Unit	South Unit
5/31	1435.93	1428.10	1429.36
6/30	1437.10	1429.20	1429.11
7/24	1436.54	1429.31	Below Gauge
8/31	1435.80	1429.10	Below Gauge
10/31	1435.56	1428.88	1428.60
POOL BOTTOMS	1429.25	1427.00	1426.00

III. Effects of the past year's water levels on the ecology of Lake Andes.

All three units of Lake Andes were completely dry in 1981. Spring moisture in 1982 did not arrive until May and most of the early migrating waterfowl had already overflowed Lake Andes looking for more suitable habitat. During the dry cycle, kochia grew to 8-10 feet tall on the lakebed. As the Lake filled this vegetation died and the resulting floating vegetation was very attractive to overwater nesters such as eared grebes and coots. Late migrating waterfowl and some renesters found ideal brood habitat on the newly flooded Lake. Fall migrants found abundant cover and food on Lake Andes and waterfowl use was high until freeze up.

IV. 1983 Water Management Objectives

Water level readings to date during 1983 are as follows:

<u>Date</u>	<u>North Unit</u>	<u>Center Unit</u>	<u>South Unit</u>
3/30	1436.89	1430.43	1429.28
4/15	1437.00	1431.22	1429.50
4/19	1437.06	1431.40	1429.48
4/30	1436.85	1431.60	1429.48
POOL BOTTOM	1429.25	1427.00	1426.00

Management objectives for 1983 are to contain as much runoff as possible in Lake Andes. In the unlikely event the water would reach the 1437.25 ft. level established by Congress, water could be released from the outlet on the South Unit.

ANNUAL WATER MANAGEMENT PROGRAM

Lake Andes National Wildlife Refuge, Lake Andes, SD

Water Unit: Owens Bay

I. Introduction

The Owens Bay Unit is a 240 acre marsh unit, separated by a dike from the South Unit of Lake Andes. A stop log water control structure is located in the dike to allow water releases into Lake Andes.

Owens Bay, in addition to water from natural runoff, is maintained by a free-flow artesian well. The well, drilled in 1957, originally had a 1000 gpm flow and water right. Well shutdowns during the 1973 DVE outbreak resulted in casing destruction and new casing had to be installed. The new casing, reduced the well opening from 12" to 8", and dropped the flow to approximately 450 gpm, where it is presently stabilized. The present well flow, without adequate Spring runoff, is unable to maintain the entire marsh, because of a 39 inch average annual evaporation rate.

II. 1982 Water Conditions

A record wet Spring in 1982 added a great deal of runoff to Owens Bay. Approximately 8-11 inches of rain fell in May, with continued thunder-showers throughout the Summer. Summer temperatures were cooler than normal, thereby reducing the evaporation rate. Good moisture conditions during the Fall and December snow (17+ inches) added to the wetland.

1982 Water Levels - Owens Bay (Pool Bottom - 1436.52)

<u>Date</u>	<u>Water Level</u>
May 31	1442.01
June 30	1441.85
July 24	1441.34
Aug. 31	1440.78
Oct. 31	1440.84

III. Effects of the past year's water levels on the ecology of Owens Bay

Early migrating waterfowl overflow Owens Bay and Lake Andes due to low water conditions. Heavy May rains added much needed moisture and later migrants found more suitable water conditions. The newly flooded marsh edges provided ideal food sources for waterfowl broods. Muskrats that had moved into Owens Bay as Lake Andes dried up began to return to the main Lake. Muskrats also moved into the newly flooded cattail stands and began to open up some of the more choked areas. Fall migrants found ideal conditions for food and cover and use was high until freeze up.

IV. 1983 Water Management Objectives

Owens Bay water levels, during 1983, to date, are as follows:

<u>Date</u>	<u>Water level</u>
3/30/83	1442.16
4/13/83	1442.36
4/19/83	1442.48 (overflowing the structure)
4/30/83	1442.37
Pool bottom	1436.52

Water management activities for 1983 are to contain as much runoff as possible in Owens Bay. The artesian well will continue to run at full flow in order to offset annual evaporation.

ANNUAL WATER MANAGEMENT PROGRAM

Lake Andes National Wildlife Refuge, Lake Andes, SD

Water Unit: Broken Arrow Waterfowl Production Area

I. Introduction

The Broken Arrow WPA in Douglas County, is a 1660 acre tract purchased in 1977. Two drainage systems existed on the property when purchased. The Mud Lake drain had an upstream watershed of 25,600 acres, while the second system, the New Holland drain had a 12,320 acre watershed. Five ditch plugs or low head dams, with concrete stop log control structures, were installed in 1979 along the drainage ditches, two on the Mud Lake ditch and the remaining three on the New Holland drain. Design specifications for the five dams are as follows:

Embankment Volume	YD ³	High Water Contour	Surface Acres	Acre-feet Impounded
Dam #1 -	76	497.6	6.2	5.7
Dam #2 -	755	497.7	27.9	82.6
Dam #3 -	2761	495.5	43.6	163.0
Dam #4 -	586	495.5	34.7	88.3
Dam #5 -	137	495.5	6.3	5.2
		TOTAL	118.7	344.8

A water rights application was not filed with the State Water Rights Commission. Area office personnel at the time, felt that since the project involved restoring drained wetlands, a permit to impound water on this area was not required.

II. 1982 Water Conditions

Heavy May rains completely filled the impoundments behind all five of the dams. Excess water flowed through the control structures and continued to drain into Platte Creek. This was the first significant moisture since the dams were constructed in 1979.

In July, disaster struck when a neighbor informed us that Dam #3 had washed out. Because of a lack of available fill material, a sandy soil was used in the construction of this dam with heavier soil being used as a cap over the sandier material. Water piped along the outlet tube of the control structure and the washout resulted.

Continued wet weather prevented the repair of the damage during 1982,

III. Effects of the past year's water levels on the Broken Arrow Waterfowl Production Area

The newly flooded wetlands attracted numerous waterfowl pairs, mostly late migrants due to the timing of the rainfall. A check of the area in July found 100+ broods using the new impoundments. Shorebirds were much in evidence around the new marsh edges. The permanent water supply had a positive impact on the resident wildlife species such as sharp-tailed grouse, prairie chickens and whitetailed deer.

IV. 1983 Management Objectives

Good moisture conditions continue and water levels remain high. Repair of the Dam #3 washout will be postponed again due to wet conditions. A 480 acre tract of land west of Dam #3 has been optioned by the FWS. This piece of land has a better site for a dam than the present location of Dam #3. If wet conditions persist and the purchase of this property continues, then Dam #3 may be moved to this more desirable location.

Water management plans for 1983 are to contain as much runoff as designed behind all four of the remaining dams on the WPA. Should any other structure appear to be in danger of being damaged, stop logs could be pulled to allow release of additional water down the drainage ditch and into Platte Creek..